

PCT

INTERNATIONAL SEARCH REPORT

(PCT Article 18 and Rules 43 and 44)

Applicant's or agent's file reference 23-65037-03	FOR FURTHER ACTION see Form PCT/ISA/220 as well as, where applicable, item 5 below.	
International application No. PCT/US2004/040460	International filing date (day/month/year) 02/12/2004	(Earliest) Priority Date (day/month/year) 02/12/2003
Applicant BATTELLE MEMORIAL INSTITUTE		

This International Search Report has been prepared by this International Searching Authority and is transmitted to the applicant according to Article 18. A copy is being transmitted to the International Bureau.

This International Search Report consists of a total of 8 sheets.



It is also accompanied by a copy of each prior art document cited in this report.

1. **Basis of the report**

- a. With regard to the **language**, the international search was carried out on the basis of the international application in the language in which it was filed, unless otherwise indicated under this item.



The international search was carried out on the basis of a translation of the international application furnished to this Authority (Rule 23.1(b)).



- b. With regard to any **nucleotide and/or amino acid sequence** disclosed in the international application, see Box No. I.



2. **Certain claims were found unsearchable** (See Box II).



3. **Unity of invention is lacking** (see Box III).

4. With regard to the title,



the text is approved as submitted by the applicant.



the text has been established by this Authority to read as follows:

5. With regard to the abstract,



the text is approved as submitted by the applicant.



the text has been established, according to Rule 38.2(b), by this Authority as it appears in Box No. IV. The applicant may, within one month from the date of mailing of this international search report, submit comments to this Authority.

6. With regard to the drawings,

- a. the figure of the drawings to be published with the abstract is Figure No. 15



as suggested by the applicant.



as selected by this Authority, because the applicant failed to suggest a figure.



as selected by this Authority, because this figure better characterizes the invention.



- b. none of the figures is to be published with the abstract.

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Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:

2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:

3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.

2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.

3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:

4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-36

A thermoelectric power source comprising a flexible substrate and a sputtered thin film of thermoelectric material and method of making it.

2. claims: 37-66

A method and apparatus for providing electrical energy by transmitting ambient energy to a thermoelectric device

3. claims: 67-85

A thermoelectric power source comprising a sputtered film of thermoelectric material and a high temperature heat pipe and a low temperature heat pipe; and/or a thermoelectric power source comprising a thin film TE module formed on a flexible substrate and a reel about which the flexible substrate is wound.

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A. CLASSIFICATION OF SUBJECT MATTER
H01L35/30 H01L35/08

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
H01L

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ, INSPEC, WPI.Data

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 297 23 309 U1 (D.T.S. GESELLSCHAFT ZUR FERTIGUNG VON DUENNSCHICHT-THERMOGENERATOR-SY) 10 September 1998 (1998-09-10)	1,4-6, 13-15, 17,18, 23,24, 26,27, 30,32,33 67-75
Y	page 4, paragraph 2 - paragraph 5; figures 2-5	
X	US 4 036 665 A (BARR ET AL) 19 July 1977 (1977-07-19)	1,4-6, 18,26, 30,31,33 34-36
A	column 2, line 30 - column 4, line 33; figures 1,2	
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☒ Further documents are listed in the continuation of box C.

☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *8* document member of the same patent family

Date of the actual completion of the international search

28 February 2006

Date of mailing of the international search report

07 MAART 2006

Name and mailing address of the ISA
European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl.
Fax: (+31-70) 340-3016

Authorized officer

Kirkwood, J

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International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 3 554 815 A (ROBERT OTTO OSBORN) 12 January 1971 (1971-01-12)	1,4,5,8, 12,18, 26,30, 31,76, 80,82-85
A	the whole document	2,3,28, 29,67, 70,71
P,X	----- US 2004/231714 A1 (STARK INGO ET AL) 25 November 2004 (2004-11-25)	1-18, 23-30, 32-36
E	the whole document - & WO 2004/105143 A (APPLIED DIGITAL SOLUTIONS; STARK, INGO; ZHOU, PETER) 2 December 2004 (2004-12-02)	1-18, 23-30, 32-36
A	----- WO 03/007391 A (FERROTEC CORPORATION) 23 January 2003 (2003-01-23)	1-36
	the whole document	
A	----- US 5 286 304 A (MACRIS ET AL) 15 February 1994 (1994-02-15)	1-36,67, 70,71,76
	the whole document	
A	----- WO 02/23642 A (FRAUNHOFER-GESELLSCHAFT ZUR FOERDERUNG DER ANGEWANDTEN FORSCHUNG E.V.) 21 March 2002 (2002-03-21)	1-36,67, 70,71,76
Y	figures 11a-18c	67-75
A	----- PATENT ABSTRACTS OF JAPAN vol. 1997, no. 08, 29 August 1997 (1997-08-29) & JP 09 107129 A (SHARP CORP), 22 April 1997 (1997-04-22) abstract	1-36,67, 70,71,76
X	----- SCHMIDT F: "Batterielose Funksensoren, betrieben mit Energie aus der Umgebung" 11 March 2002 (2002-03-11), XP002231431 Retrieved from the Internet: URL: http://www.enocean.com/comments/tagung0302.pdf 'retrieved on 2006-02-28! the whole document	37-66
X	----- WO 03/015186 A (ENOCEAN GMBH; ALBSMEIER, ANDRE; BULST, WOLF-ECKARDT; PISTOR, KLAUS; SC) 20 February 2003 (2003-02-20)	37-66
	the whole document	
X	----- WO 02/095707 A (ENOCEAN GMBH; ALBSMEIER, ANDRE; BULST, WOLF-ECKHART; PISTOR, KLAUS; SC) 28 November 2002 (2002-11-28)	37-66
	the whole document	
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International Application No
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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	US 6 232 543 B1 (NAGATA YOICHI) 15 May 2001 (2001-05-15) the whole document	37-66
Y	PATENT ABSTRACTS OF JAPAN vol. 1997, no. 12, 25 December 1997 (1997-12-25) - & JP 09 224387 A (WAKABAYASHI TADATOSHI), 26 August 1997 (1997-08-26) abstract	67-85
Y	PATENT ABSTRACTS OF JAPAN vol. 2003, no. 10, 8 October 2003 (2003-10-08) - & JP 2003 179275 A (YASKAWA ELECTRIC CORP), 27 June 2003 (2003-06-27) abstract; figure 6	67-85
A	US 4 520 305 A (CAUCHY ET AL) 28 May 1985 (1985-05-28) figures 9,11	67-85
A	US 4 312 402 A (BASIULIS ET AL) 26 January 1982 (1982-01-26) the whole document	67-85
A	US 2002/148236 A1 (BELL LON E) 17 October 2002 (2002-10-17) the whole document	67-75
A	US 2002/139123 A1 (BELL LON E) 3 October 2002 (2002-10-03) the whole document	67-75

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Information on patent family members

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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 29723309	U1	10-09-1998	NONE
US 4036665	A	19-07-1977	NONE
US 3554815	A	12-01-1971	BE 647314 A 29-10-1964 CH 413018 A 15-05-1966 FR 1409754 A 03-09-1965 GB 1021486 A 02-03-1966 LU 45995 A1 29-10-1964 NL 6404737 A 02-11-1964
US 2004231714	A1	25-11-2004	AU 2004241965 A1 02-12-2004 CA 2526270 A1 02-12-2004 EP 1625629 A1 15-02-2006 US 2005252543 A1 17-11-2005 WO 2004105143 A1 02-12-2004
WO 2004105143	A	02-12-2004	AU 2004241965 A1 02-12-2004 CA 2526270 A1 02-12-2004 EP 1625629 A1 15-02-2006 US 2005252543 A1 17-11-2005 US 2004231714 A1 25-11-2004
WO 03007391	A	23-01-2003	CN 1541422 A 27-10-2004 EP 1405353 A1 07-04-2004 JP 2005507157 T 10-03-2005 US 6410971 B1 25-06-2002
US 5286304	A	15-02-1994	NONE
WO 0223642	A	21-03-2002	CA 2422471 A1 14-03-2003 DE 10045419 A1 04-04-2002 EP 1317779 A2 11-06-2003 US 2004075167 A1 22-04-2004
JP 09107129	A	22-04-1997	NONE
WO 03015186	A	20-02-2003	DE 10137504 A1 27-02-2003
WO 02095707	A	28-11-2002	DE 10125058 A1 12-12-2002 EP 1389332 A1 18-02-2004 US 2004242169 A1 02-12-2004
US 6232543	B1	15-05-2001	NONE
JP 09224387	A	26-08-1997	NONE
JP 2003179275	A	27-06-2003	NONE
US 4520305	A	28-05-1985	NONE
US 4312402	A	26-01-1982	NONE
US 2002148236	A1	17-10-2002	NONE
US 2002139123	A1	03-10-2002	CN 1496468 A 12-05-2004 EP 1366328 A1 03-12-2003 JP 2004526930 T 02-09-2004

Information on patent family members

National Application No

PCT/US2004/040460

Patent document
cited in search report

Publication date

Patent family member(s)

Publication date

US 2002139123 A1

WO	02065030	A1
US	2003005706	A1

22-08-2002
09-01-2003